RESULTS OF FAST $O(^3P)$ COLLISIONS WITH C_2H_2, PROGRESS ON $O(^3P)$ EXCITATION OF $HNCO$, AND DETECTION OF NEW DISSOCIATIVE CHANNELS IN NO

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Using the JPL atomic-oxygen facility, we have observed optical emission in gas-phase single collisions of fast (3-22 eV translational energy) $O(^3P)$ atoms with acetylene. Optical emissions were measured in the wavelength range 300-850 nm, and corresponded to the $CH\ A\ ^2\Delta \rightarrow X\ ^2\Pi$, and $B\ ^2\Sigma^- \rightarrow X\ ^2\Pi$, transitions [1], The $A \rightarrow X$ and $B \rightarrow X$ emissions were fit to a synthetic spectrum of $CH(A)$ at a vibrational temperature T_v of 10000 K (0,86 eV) and a rotational temperature T, of approximately 5000 K (0.43 eV); and $CH(B)$ to T_v = 2500 K (0.22 eV) and T, = 1 000 K (0.09 eV). The energy threshold for the $A \rightarrow X$ emission was measured to be $7.3 \pm 0{,}4$ eV (lab) or 4.5 $\pm$ 0.2 eV (c, m.), This agrees with the energy threshold of 7.36 eV (lab) for the reaction $O(^3P) + C_2H_2 \rightarrow CH(A) + HCO$.

Work in progress involves the synthesis of the unstable molecule $HNCO$. The simplest method appears to be by dropwise addition of a concentrated solution of potassium cyanate to phosphoric acid, with collection of the evolved $HNCO$ in a dry-ice acetone trap. The excitation spectrum of $O(^3P) + HNCO$ will be studied, and correlations made with shuttle-exhaust observations in several recent flights.

Finally recent results, using the same experimental apparatus, of dissociative electron attachment to NO will be presented [2], In addition to the known $N(^2D^o) + O^-(^2P)$ channel, two new channels $N(^4S^o) + O^-(^2P)$ and $N(^2P^o) + O^-(^2P)$ were detected. Cross sections for each of the channels were obtained by normalizing the scattering intensities to previously-measured total cross sections.

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[2] O. J. Orient and A. Chutjian, *Phys. Rev. Letters 74,* 5017 (1 995).